DOCUMENT RESUME

ED 463 955 SE 065 787

TITLE	Energy Smart Schools: Creating a Sustainable Learning Environment in Ohio.
INSTITUTION	Ohio Energy Project, Lewis Center.
SPONS AGENCY	Department of Energy, Washington, DC.; Ohio State Dept. of Development, Columbus.; National Energy Education Development Project, Reston, VA.
PUB DATE	2000-00-00
NOTE	17p.; Also supported by Rebuild America, Energy Smart Schools, and Lord, Sullivan & Yoder, Inc.
AVAILABLE FROM	Ohio Energy Project, 7099 Huntley Road, Suite 105A, Columbus, Ohio 43229-1068. Tel: 614-785-1717; Fax: 614-785-1731; e-mail: OEP@ohioenergy.org; Web site: http://www.ohioenergy.org.
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	MF01/PC01 Plus Postage.
DESCRIPTORS	Conservation (Environment); Elementary Secondary Education; *Energy Education; *Environmental Education; *General Education; Program Guides
IDENTIFIERS	*Ohio

ABSTRACT

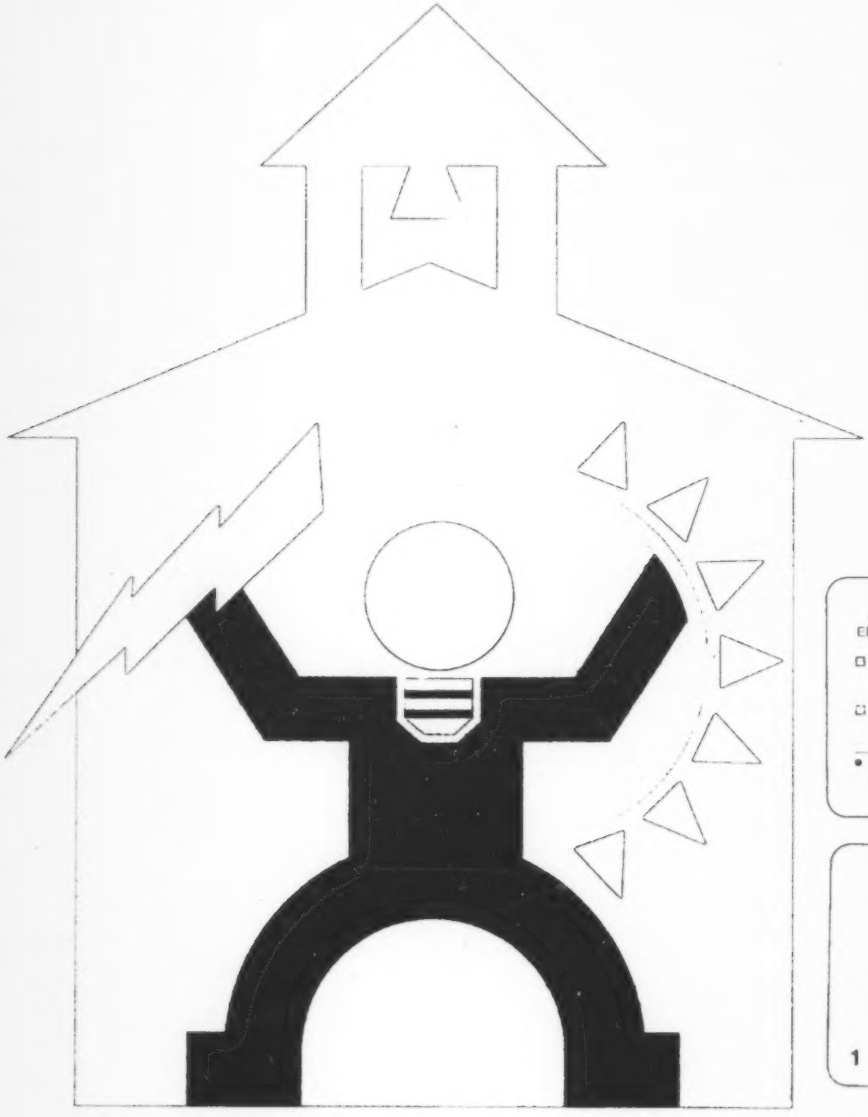
In 1999, the Ohio Energy Project (OEP) was awarded a grant through Rebuild America, under the U.S. Department of Energy, to develop an EnergySmart Schools Program for Ohio. Together with its partners, this program serves to empower students to improve the conditions of their school buildings through education, thus increasing scientific literacy and improving Proficiency Test scores. The goals of the federal EnergySmart Schools Program are to reduce energy consumption and costs and increase the use of clean energy technologies in K-12 schools nationwide; help schools reinvest their savings from energy improvements; improve the learning environment of schools through daylighting, better temperature control, better air quality and other elements related to buildings and bus fleets; and increase student, teacher and community awareness of energy and related issues including financial management, air quality, climate change, and new technologies. This publication describes in detail the plans for implementation of this national program in Ohio. Included are an action plan; guides to making energy efficient choices and utilizing alternative energy sources; a description of several education programs in Ohio schools; and a list of information resources. (MM)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 463 955

EnergySmart Schools

Creating a Sustainable Learning Environment in Ohio



U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

S. Nix

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

1

BEST COPY AVAILABLE

SE065787

ENERGYSMART SCHOOLS... A CAMPAIGN OF REBUILD AMERICA

EnergySmart Schools, a campaign of Rebuild America, is a network of community partnerships made up of local governments and businesses that save money by conserving energy. These voluntary partnerships work with the U.S. Department of Energy to choose the best ways to improve the energy efficiency of commercial, government, residential and school buildings. The EnergySmart Schools campaign is a crosscutting initiative that addresses not only buildings and technologies, but also transportation and student activities. The goals for EnergySmart Schools are to:

- Reduce energy consumption and costs, and increase the use of clean energy technologies in K-12 schools nationwide.
- Help schools reinvest their savings from energy improvements.
- Improve the learning environment of schools through daylighting, better temperature control and better indoor air quality, along with other elements related to buildings and bus fleets.
- Increase student, teacher, and community awareness of energy and related issues including financial management, air quality, climate change, and new technologies.

In 1999, the Ohio Energy Project (OEP) became a Rebuild America Partner under the Rebuild Ohio Partnership by accepting the challenge to develop an EnergySmart Schools Program for the state of Ohio. OEP is working with individual schools as well as entire school districts to develop teacher-driven, student-managed programs that increase energy awareness and lead to improved energy efficiency and increased savings. OEP also provides assistance to districts through its Rebuild America partners to review the structural condition and energy efficiency of their school buildings.

Through Ohio's EnergySmart Schools Program, OEP provides Ohio's schools, school districts, and communities with tailored resources to help make school buildings, buses, teachers, staff and students energy smart. OEP works with our Rebuild America Partners; the Ohio Department of Development, Office of Energy Efficiency; the Ohio School Facilities Commission; energy service companies and others to provide the comprehensive information and support that is available to schools in Ohio.

TABLE OF CONTENTS

OVERVIEW
National Overview 2
Ohio's EnergySmart Schools 3
Editorial Review Board 3
Our Challenge 4
Action Plan 5

BUILDINGS
Sustainability 6–7
Making Energy Efficient Choices 8
Utilizing Alternative Energy Sources 9
Energy Conservation (H.B. 264) Program ... 10

EDUCATION
Education Programs Through H.B. 264 11
OESSP Education Programs 12–14
Resources 15
Proclamation 15
OEP Board of Directors 16

Developed with the generous support of:

Ohio Department of Development

WE PUT ENERGY INTO EDUCATION
National Energy Education Development

LORD, SULLIVAN & YODER, INC.

©2000 Ohio Energy Project • 7099 Huntley Rd., Suite 108A • Columbus, OH 43229 • 614-785-1717

BEST COPY AVAILABLE

OHIO'S ENERGYSMART SCHOOLS ...A PROGRAM OF OHIO ENERGY PROJECT

OEP is an affiliate of the NEED (National Energy Education Development) Project, providing energy education materials, leadership training and professional development opportunities for teachers and students throughout Ohio. OEP, honored as one of Ohio's BEST Practices in Education, has adopted "Kids Teaching Kids" as its cornerstone philosophy and engaged over 100,000 students and thousands of teachers since its inception in 1984.

The "Kids Teaching Kids" philosophy is the foundation for all OEP programs and a necessity for Ohio's EnergySmart Schools Program. This program empowers students at all grade levels to take responsibility for reducing energy consumption in their school and uses the real-world problem of limited energy resources as an opportunity for academic success. By learning to identify areas for improvement, students begin to understand the scientific concepts such as heat and energy transfer and then develop solutions for the unique set of circumstances within their school.

Under the guidance of their teachers and with the support of OEP and its partners, students gather information about energy consumption in their school building. They report their findings, with recommendations for improving their learning environment, to school administrators. By studying energy issues, students develop a strong foundation of scientific literacy and practical skills that will serve them well in the business world. Through Ohio's EnergySmart Schools Program, all students and teachers in your district can become EnergySmart leaders.

EDITORIAL REVIEW BOARD

Emanuel O. Anunike
Energy Specialist
Ohio Department of Development
Office of Energy Efficiency

Franklin Brown
Project Administrator
Ohio School Facilities Commission

Martha Callan, Curriculum Director
National Energy Education Development (NEED) Project

Norma Dulin, President
The Growth Factor

Tim Gehring
Director of Facility Management
Worthington Schools

Merrilee Harrigan
Senior Program Manager
Alliance to Save Energy

Glen Kizer, President
Foundation for Environmental Education

I. Martin Kraus, D.O.
Board Certified
Adolescent Psychiatrist

Juli Pollit, Deputy Director
Chicago Regional Office
U.S. Department of Energy

William L. Manz, Commercial and Industrial Programs Manager
Ohio Department of Development
Office of Energy Efficiency

Bob Sabo
President and Managing Partner
Sabo/Limbach Energy Services Company

Lorenz V. Schoff
National K-12 School Sector
Technical Advisor, Rebuild America

Ron Shelton, Program Manager
Buildings Technology Center
Oak Ridge National Lab

Sam Spofforth, Director
Project CLEAR, Columbus Health Department

Sara Ward, Chief
Ohio Department of Development
Office of Energy Efficiency

OHIO ENERGY PROJECT

Elaine L. Barnes
Statewide Coordinator, EnergySmart Schools Program
Scientific Advisor
ebarnes@ohioenergy.org

Mary McCarron
CPS Education Coordinator
EnergySmart Schools Program
mmccarron@ohioenergy.org

Shauni Nix, Executive Director
snix@ohioenergy.org

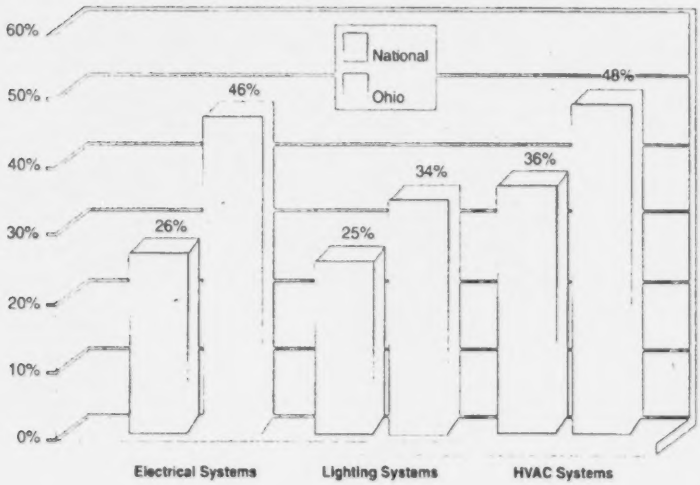
Rich Smith, Director
rsmith@ohioenergy.org

Annie Rasor, Programs Manager
arasor@ohioenergy.org

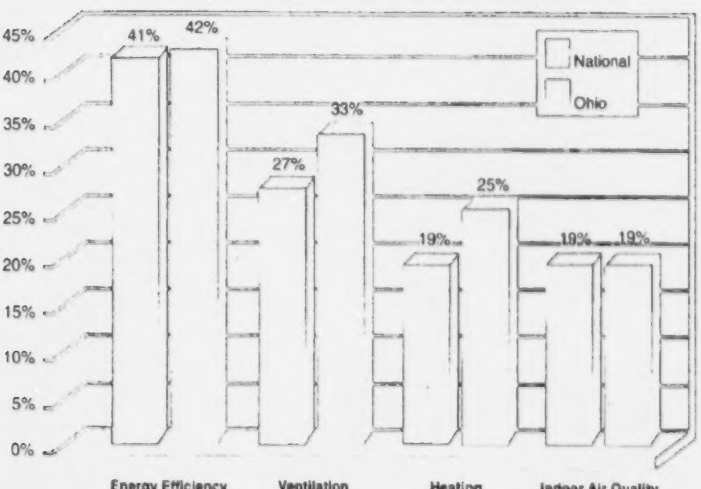
Our Challenge

The 1995 GAO Report to the U.S. Senate identified over $112 billion in needed repairs, renovations and modernizations for our nation's public schools.[1] A significant portion of the report discussed the energy systems in school buildings that impact the quality of lighting, ventilation, indoor air quality, heating and cooling. Rebuild America partnerships between businesses and schools can facilitate and support the improvement in the condition and efficiency of the schools, thus improving the conditions where "*Teachers Teach and Children Learn.*"

Percentages of Ohio Schools with Inadequate Building Features[1]



Percentages of Ohio Schools with Poor Energy Systems[1]



OHIO'S SCHOOL STATISTICS:

- Ohio ranks **6th** in the nation in student population.[1]
- Ohio ranks **35th** in the nation for the overall structural condition of buildings for the average school district.[1]
- Ohio ranks **50th** in the nation for the overall structural condition of individual school buildings.[1]
- Ohio ranks **48th** in the nation in quality of indoor environment in school buildings.[1]
- **50%** of Ohio schools are 50 years or older.**
- **75%** of Ohio elementary schools are 30 years or older.**

OHIO'S TOP TEN ENERGY EFFICIENT SCHOOLS*

Buckeye Valley Middle
Hudson High
North Royalton Middle
Waterville Elementary
James Conger Elementary
Hilliard Horizon Elementary
Rutherford B. Hayes High
Anna Elementary
Sabina Elementary
A.I. Root Middle

[1] Profile of School Conditions by State, GAO Report to Congress, GAO/HEHS-96-148.

* Directory of Public Elementary and Secondary Education Agencies (1994-1995), US Dept. of Education, NCES97-539.

** 1990 Ohio Public School Facility Survey. A report from Ohio Department of Education; to the 118th General Assembly, November, 1990.

BEST COPY AVAILABLE

ACTION PLAN

1. Contact OEP. www.ohioenergy.org
   - ▷ OEP will help you become a Rebuild America partner under the Rebuild Ohio Partnership.
   - ▷ Begin education programs for students and professional development for teachers.
   - ▷ Integrate energy efficiency into your curricula.

2. Audit your school/district's energy consumption.
   - ▷ Utilize the Rebuild Ohio Partnership to perform energy audits and make recommendations.
   - ▷ Use your school building as a learning laboratory for students to audit classrooms, the building envelope and landscape.

3. Access your data and evaluate your needs.
   - ▷ Work with OEP and the Rebuild Ohio Partners to establish what your school/district needs for improving building performance.
   - ▷ Discover what your school/district can do to reduce energy consumption by changing behavior.
   - ▷ Replace old, worn equipment with newer, energy-efficient equipment that carry the **ENERGY STAR®** Label. For more information about implementing a school district purchasing policy for **ENERGY STAR** labeled products, visit www.energystar.gov.

4. Contact the Ohio School Facilities Commission to obtain information about H.B. 264 for project funding. www.osfc.state.oh.us

5. Involve the entire school body by creating a sustainable learning environment.
   - ▷ Work with Rebuild Ohio Partners to help your administrators.
   - ▷ Develop EnergySmart leaders at all levels within your school/district.
   - ▷ Educate facility, grounds, maintenance and janitorial staff about changes to take place and address concerns they may have.

6. Measure each building's energy performance with the **ENERGY STAR** portfolio manager, which rates school buildings on a scale of 0 to 100. Schools that score a 75 or above and meet indoor air quality requirements can qualify for the **ENERGY STAR** Label, a bronze plaque that can be displayed on the outside of your school to symbolize top energy performance.

7. Celebrate and share your accomplishments with local educators, schools, community, government and businesses, together with OEP and Rebuild Ohio partners.

- The average school in the United States was built 42 years ago.[1]
- Seventy percent of U.S. schools were built before 1970.[1]
- The estimated annual energy cost for all schools is $6 billion.[1]
- The projected annual energy savings through energy management is $1.5 billion.[1]

The challenge is for the community and schools to form a partnership dedicating the commitment and resources to produce energy improvements in the schools.

These improvements will result in a reduction in energy consumption and costs and an improvement in conditions and environment where "Teachers Teach and Children Learn."

A sustainable school building is an **excellent teaching tool** for the students it supports, **encouraging** the **sustainable concepts** to become part of everyday life and continue well into the future.

BEST COPY AVAILABLE

Sustainability

WHAT IS SUSTAINABILITY?

Sustainability is meeting the needs and desires of the present without compromising the ability of children to meet their own needs in the future.

Sustainable buildings, designed with a whole building approach, are energy efficient and use renewable energy and environmentally preferable materials to the fullest extent possible. Consideration must be given to site selection, architectural design, building method and materials, and landscaping practices for both new buildings and those undergoing improvements.

The benefits of sustainable design to schools include:

- lower operating and maintenance costs.
- improved indoor air quality.
- decreased impact on environment.
- potential for increase in test scores.
- improved health of students and staff.
- reduced absenteeism.

Sustainable buildings are designed to:

- conserve energy and maximize the use of renewable energy.
- use environmentally preferable materials.
- enhance indoor air quality.
- conserve water.
- optimize operational and maintenance practices.
- optimize site potential.
- educate building occupants about efficiency and conservation.

Sustainable design results in an improved learning and teaching environment.

Design elements to consider when creating a sustainable building include:

- energy efficient building shell.
- energy efficient lighting and electrical systems.
- site planning and landscape.
- indoor air quality/indoor environment
- daylighting.
- transportation.
- environmental building products and systems.
- water conservation.
- recycling systems and waste management.
- commissioning, operation, and maintenance.

In our every deliberation,
we must consider the impact of our
decisions on the next seven generations.

–Attributed to the Iroquois Confederation, 18th century

Adapted from Rebuild America K-12 School Profile "Community Partnerships to Improve the K-12 Learning Environment Through Leveraged Energy Savings," August 1999.

High Performance Design (Sustainability)

DESIGN ELEMENT	ACTION	RESULT
Site Planning and Landscaping	◦ Use site's natural conditions ◦ Use greenery that requires little or no watering ◦ Use passive solar design	◦ Reduces energy load on building ◦ Highlights natural resources ◦ Creates an outdoor learning laboratory
Daylighting	◦ Use indirect sunlight to provide lighting ◦ Use roof monitors ◦ Install light shelves and automatic zone dimming	◦ Minimizes need for artificial lighting ◦ Reduces energy load on building ◦ Improves occupant performance
Building Envelope	◦ Use insulation with high R-values on walls and ceilings ◦ Utilize light color roofing and reflecting walls ◦ Have energy efficient windows on mainly northern and southern walls	◦ Reduces cooling load ◦ Reduces energy load ◦ Reduces draftiness ◦ Increases occupant comfort level
Photovoltaics	◦ Utilize energy source present at site	◦ Reduces load during peak energy usage ◦ Develops student interest in alternative energy sources
Lighting	◦ Use high efficiency lamps ◦ Use motion and infrared occupancy sensors	◦ Reduces electricity consumption ◦ Reduces excess heat from inefficient lamps ◦ Increases occupant comfort level
Mechanical Systems	◦ Use heat recovery systems ◦ Install geothermal energy systems	◦ Reduces all forms of energy consumption
Green Materials	◦ Use recycled materials ◦ Use recyclable materials ◦ Use non-toxic materials ◦ Install long-life fixtures ◦ Choose energy efficient appliances	◦ Reduces contribution to lung ailments ◦ Reduces environmental impact
Indoor Air Quality	◦ Install air filtration and exchange systems	◦ Eliminates potential sources of allergens, contaminants and toxins
Water Conservation	◦ Install low-flow and water-conserving fixtures ◦ Install waterless urinals ◦ Install two-pipe water systems	◦ Conserves water in necessary processes ◦ Reuses water where possible
Commissioning and Maintenance	◦ Make it part of all processes – programming, planning, design, construction and operations ◦ Educate the staff in proper system operations	◦ Ensures maximum life of equipment ◦ Keeps equipment running as efficiently as possible

Adapted from Rebuild America K-12 School Profile "Community Partnerships to Improve the K-12 Learning Environment Through Leveraged Energy Savings," August 1999.

DAYLIGHTING AND PRODUCTIVITY

In June 1999, the Heschong Mahone Group (HMG) released the results of their study of daylighting in schools. The results support the long-held belief that academic performance can be improved by incorporating daylighting into the classroom. The study was requested by the California Board of Energy Efficiency and was one of the most extensive to date. The results clearly show positive correlations between student performance and diffused daylighting in the classroom. The effect can be enhanced by utilizing electronically controlled, dimmable ballasts.

Researchers hypothesize several explanations for the increases in performance. Including diffused daylight in the classroom and controlling light levels electronically allowed for better visibility due to higher illumination as well as improved light quality and distribution. In the classrooms that did not have daylight prior to the retrofit, researchers hypothesize that the inclusion of daylight improved the health and mood of the students, leading to improved behavior of the student population.

Adding natural lighting to and improving the lighting conditions of your classroom can positively impact the mental health of its occupants. It is estimated that 10-20%* of the population suffers from a mild case of winter depression, or seasonal affective disorder (SAD). Medical researchers hypothesize that seasonal changes in the amount of sunlight interfere with our circadian rhythms, "biological internal clocks." This can cause symptoms such as fatigue, sleepiness and difficulty with concentration. For mild cases of SAD, increased exposure to natural lighting can provide significant relief of these symptoms.

For more information on the HMG study, contact the California Board of Energy Efficiency and request a copy of "Daylighting in Schools — An Investigation into the Relationship between Daylighting and Human Performance," by the Heschong Mahone Group, HMG Project #9803, June 1999. This report can also be downloaded from www.h-m-g.com.

ENERGY STAR® THE SYMBOL FOR ENERGY EFFICIENCY

ENERGY STAR is the trusted symbol that makes it easy to make a difference in protecting the environment while saving money. **ENERGY STAR** labeled products use less energy than traditional products, save your school or district money on utility bills, and help protect the environment. Your school district can implement a purchasing policy to buy **ENERGY STAR** labeled products such as electronics (TVs, VCRs), office equipment (copiers, fax machines, computers, monitors, printers, scanners, and multi-function devices) and building equipment (exit signs, transformers, lamps/bulbs, roof products, programmable thermostats and windows). To implement a purchasing policy for **ENERGY STAR** labeled products visit www.energystar.gov and click on institutional purchasing.

Money Isn't All You're Saving

There is now an on-line portfolio manager that allows K-12 schools to track and measure energy performance. High performers who score 75 or above on a scale of 0 to 100 can apply for the **ENERGY STAR** Label. To see if your building qualifies, follow the steps below:

1. Determine if the building is eligible to be benchmarked (www.epa.gov/buildings/label).
2. Log-on to the Portfolio Manager and enter the required energy and building information.
3. Determine if the building scores at or above 75.
4. If your school scores 75 or above, determine if the school meets industry standards for indoor air quality through a review by a licensed professional engineer.
5. Read and understand the **ENERGY STAR** logo use guidelines (www.epa.gov/buildings/label/logo-use-guidelines.pdf).
6. Print the application letter (www.epa.gov/buildings/label/loa.doc) (or copy onto your own letterhead) and mail to U.S. EPA along with the Statement of Energy Performance:

   Director, **ENERGY STAR** Label for Buildings
   U.S. Environmental Protection Agency (6202J)
   1200 Pennsylvania Ave, Washington, DC 20460

*Family Doctor Handouts American Academy of Family Physicians, 2000.

SOLAR ENERGY — THE MILLION SOLAR ROOFS INITIATIVE

Million Solar Roofs is an initiative to install solar energy systems on one million U.S. buildings by 2010. The initiative includes two types of solar energy: photovoltaics (PVs) that produce electricity from sunlight and solar thermal panels that produce heat for domestic hot water, space heating or heating swimming pools. The minimum requirement to be eligible as a Million Solar Roofs Partner is a one kilowatt PV array or a 100-square-foot solar heater that generates 4 kilowatts of power.

Ohio Schools Going Solar is led by the Ohio Department of Development's Office of Energy Efficiency and the Foundation for Environmental Education. The first school in Ohio to become a Million Solar Roofs Partner was Bluffsview Elementary in Worthington with a 2-kilowatt solar array. The data from this array is available to the public on a website supported by American Electric Power and Datapult.

To see data from the Bluffsview array, visit:
www.aepes.com/datapult

To learn more about solar energy in Ohio, visit:
www.the-environment.org

To learn how Ohio government supports renewable technology, visit:
www.odod.state.oh.us/cdd/oee

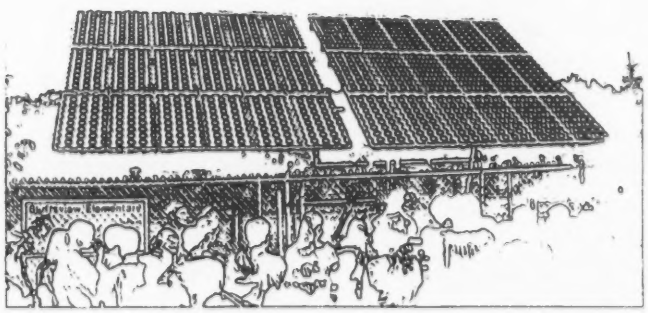
ALTERNATIVE FUELS — CLEAN CITIES PROGRAMS

Clean Cities is a program, sponsored by the U.S. Department of Energy, designed to encourage the use of alternative fuel vehicles (AFVs) and their supportive infrastructure throughout the nation. The Clean Cities program works with coalitions of local stakeholders to help develop the AFV industry and integrate this development into a larger planning process.

In Ohio, the Clean Cities Partners are currently working to develop a market for alternative fuels, including natural gas, propane, electricity and biomass fuels such as ethanol (E85) and biodiesel (B20). Grant programs and other support are available for school districts that are interested in utilizing alternative fuels and located within a designated Clean City. Using alternative fuels in your buses can qualify your district for federal grants to purchase new AFVs as well as grants to change the infrastructure to support the use of less polluting fuels.

For information about a Coalition near you:

Cincinnati – www.oki.org
Cleveland – www.earthdaycoalition.org/ccities
Columbus – www.projectclear.org



Energy Conservation (H.B. 264) Program

OHIO HOUSE BILL 264 (1985)

In 1985, the Ohio House of Representatives enacted legislation that gives school districts an opportunity to make energy efficiency improvements to their buildings and use the financial savings to pay for those improvements. The Energy Conservation (H.B. 264) Program is an innovative program that provides districts the ability to incur unvoted indebtedness. This limited borrowing authority has given districts the ability to save millions in utility bills and operating costs at no additional taxpayer expense.

The Ohio School Facilities Commission (OSFC) determines whether schools are eligible for the H.B. 264 Program. The major requirements for program eligibility are that the energy conservation measures (ECMs) save energy and that the cost of making the improvements is less than the projected dollar amount of the energy saved by the ECMs over a 15-year period.

Since the inception of the program, revisions made to the original legislation allow for staff to be trained on new equipment. In addition to staff training, the bill supports education of teachers and students about energy efficient behavior in order to help reduce consumption. OEP is a leader in the state in providing this educational support. Currently, over 500 Ohio school districts have taken advantage of this unique opportunity.

Energy Conservation Measures may include:

- Insulation of the building structure and of systems within the building.
- Storm windows and doors, multi-glazed windows and doors, heat-absorbing or heat-reflective glazed and coated window systems, additional glazing, reductions in glass area and other window and door system modifications.
- Automatic energy control systems.
- Heating, ventilation or air conditioning system modifications or replacements.
- Caulking and weatherstripping.
- Replacement or modification of lighting fixtures to increase the energy efficiency of the system without decreasing the overall illumination of a facility, unless a decrease in illumination is necessary to conform to the applicable state or local building code for the proposed lighting system.
- Energy recovery systems.
- Co-generation systems that use waste heat or steam from electricity production for use primarily within a building or complex of buildings.
- Educational programs associated with the energy conservation measures, such as provided by OEP.
- Any other modification, installation, or remodeling approved by the Ohio School Facilities Commission.

For more information about H.B. 264 and other OSFC programs visit:
www.osfc.state.oh.us

BEST COPY AVAILABLE

WORTHINGTON SCHOOLS H.B. 264 PROJECT – CLASSROOM SUPPORT FOR TEACHERS

In 1999, OEP contracted with the Limbach Company to provide an educational program to complement the H.B. 264 Project in Worthington Schools (WS). Limbach was aware that educating students and teachers about energy efficiency was essential for maximizing efficiency and saving the most money for the district. WS recognized that including an education program in tandem with the retrofits would be an ideal situation for students to experience energy issues. The facility and education leaders in the district worked together to find ways to improve the sustainability of their schools and the science proficiency of students.

Currently, an OEP education coordinator dedicates time to WS, visiting each sixth- and eighth-grade classroom an average of four times per year. OEP has established energy leadership programs and energy clubs within the district and has developed customized materials to support its educational programs. In addition to educational duties, OEP staff assist in marketing the efforts of the district on the local, state and national levels and act as a liaison between the facility and education sectors of the school district.

WS has completed a retrofit of 1.6 million square feet of floor space in 26 buildings with a projected annual savings of $270,000. In addition to the standard retrofits and the accompanying education program, Worthington has installed a 2-kilowatt PV array (the first Ohio school to be a Million Solar Roofs Partner), and is negotiating the use of biodiesel (B20) in its current fleet of buses while considering the purchase of new buses, capable of running on other alternative fuels.

COLUMBUS PUBLIC SCHOOLS H.B. 264 PROJECT – PROFESSIONAL DEVELOPMENT FOR EDUCATORS

Sabo/Limbach Energy Services Company began work with Columbus Public Schools (CPS), the Urban Systemic Initiative and OEP in the summer of 1999 to develop plans for their fourth H.B. 264 Project. In May 2000, the CPS Board of Education unanimously supported the project. The project includes continuous upgrades, new lighting systems, new boiler systems and the complete redesign of one of the buildings in the district that has not been used in years.

The education portion of the project was designed to assist teachers in utilizing materials available to them in their school to enhance their ability to teach science. The main focus of this program is professional development workshops for the educators in the district. OEP will work with teachers over a two-year period to build 40 Energy Bikes. The Energy Bike is a 21-speed mountain bike with an attached 12-volt generator. A rider can power various appliances such as light bulbs, a radio or hair dryer.

OEP will also assist teachers in developing Energy Leadership programs within CPS. The goal of these programs will be to encourage energy awareness and to monitor the effect of energy efficient behaviors within the schools. Finally, OEP is coordinating with a group of graduate fellows from The Ohio State University to develop curriculum-based lessons that will allow students to study energy consumption in the classroom through computerized energy monitoring systems.

CPS is in the process of retrofitting over 10 million square feet of building space, which is projected to save $1.2 million each year.

BEST COPY AVAILABLE

STUDENT INVOLVEMENT IN OHIO'S ENERGYSMART SCHOOLS PROGRAM (OESSP)

The goals of OESSP are to empower students and teachers to help design their learning environment, save dollars based on energy savings through behavior modification, improve student performance in state science learning competencies and encourage school districts to improve the energy efficiency of their buildings through teacher and student leadership and research. The student roles and grade levels are:

- **Primary** (K–3): EnergySmart Patrol contributes to energy savings by patrolling the building for EnergySmart behaviors.
- **Elementary** (4–6)/**Junior** (7–8): EnergySmart Leaders and Researchers coordinate building-wide efforts such as Building Comfort Surveys, Zero Waste Lunch days and other energy efficiency activities. They can also conduct building-wide and/or district-wide energy audits and compile information into graphs and charts to be displayed in the building.
- **Senior** (9–12): EnergySmart Ambassadors present findings from various buildings in well-documented forms to the school administration including principals, superintendents and school boards and may also help conduct energy audits in district buildings.

ENERGYSMART PATROL (K–3)

Students develop a campaign to increase awareness of energy consumption by creating posters, producing announcements and building-wide contests. Students monitor building occupants to increase EnergySmart behaviors and reduce utility costs.

CORRELATION TO FOURTH-GRADE LEARNING OUTCOMES OF THE OHIO PROFICIENCY TESTS

READING

Given a nonfiction text to read silently, learners will demonstrate an understanding of language and elements of nonfiction by responding to items in which they:

- Demonstrate an understanding of text by retelling information, in writing, in their own words.
- Analyze the text, examining, for example, comparison and contrast, cause-and-effect, or fact and opinion.
- Demonstrate an understanding of text by predicting outcomes and actions.

MATHEMATICS

- Select appropriate notation and methods for symbolizing a problem situation, translate real-life situations into conventional symbols of mathematics, and represent operations using models, conventional symbols and words.
- Decompose, combine, order and compare numbers.
- Make or use a table to record and sort information (in a problem-solving setting using simple and complex patterns in nature, art, or poetry as setting) and make identifications, comparisons, and predictions from tables, picture graphs, bar graphs, and labeled picture maps.

CITIZENSHIP

- Demonstrate a knowledge of and ability to think about the relationship among events by identifying cause-and-effect relationships.
- Classify various economic activities by production and consumption.
- Differentiate between statements of fact and opinion found in information about public issues and policies.
- Identify and assess the possibilities of group decision-making, cooperative activity, and personal involvement in the community.

SCIENCE

- Select instruments, make observations, and/or organize observations of an event, object, or organism.
- Analyze a series of events and/or simple daily or seasonal cycles and predict the next likely occurrence in this sequence.
- Demonstrate an understanding of safe use of materials and/or devices in science activities.
- Identify and/or describe the relationship between human activity and the environment.
- Demonstrate an understanding of the basic needs of living things.

BEST COPY AVAILABLE

COMFORT SURVEY (4–8)

Students develop a survey to be distributed to teachers and staff for each room in the school. The survey traces occupant comfort in all seasons, room ventilation and drafts, window direction and perceived indoor air quality. Students collect data and analyze the results in comparative graphs and trace heat flow through the use of building maps. Finally, students display the results of their survey and report their findings to the school principal and maintenance supervisor.

CORRELATION TO SIXTH-GRADE LEARNING OUTCOMES OF THE OHIO PROFICIENCY TESTS

READING AND WRITING

The student will use the writing process to make the writing activities clear for the intended audience as evidenced by the capacity to:

- Focus on the topic with adequate supporting ideas or examples;
- Exhibit a logical organizational pattern that demonstrates a sense of flow and conveys a sense of completeness and wholeness;
- Communicate clarity of thought; and
- Use complete sentences except where purposeful phrases or clauses are desirable.

Given a nonfiction text to read silently, learners will demonstrate an understanding of text and elements of nonfiction by responding to items in which they:

- Summarize the text;
- Infer from the text;
- Respond to the text; and
- Compare and/contrast aspects of the text.

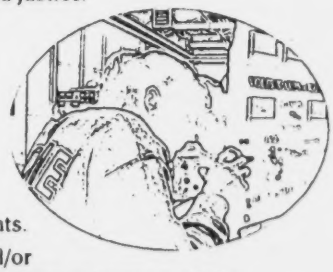
MATHEMATICS

- Apply appropriate notations and methods for symbolizing the problem statement and solution process.
- Identify needed and given information in a problem situation, as well as irrelevant information.
- Validate and/or generalize solutions and problem-solving strategies.
- Compute with whole numbers, decimals, and fractions.
- Use variables to describe arithmetic processes, to generalize arithmetic statements and to generalize a problem situation.
- Collect data, create a table, picture graph, bar graph, circle graph or line graph and use them to solve application problems.
- Read, interpret, and use tables, charts, maps, and graphs to identify patterns, note trends, and draw conclusions.
- Make predictions of outcomes of experiments based upon theoretical probabilities and explain actual outcomes.

CITIZENSHIP

- Utilize map skills to distinguish between relevant and irrelevant information on a map for a specific task.
- Interpret and analyze maps, charts, or graphs to formulate geographic ideas and determine and explain relationships among resources, economic activities and population distribution.
- Identify factors that influence consumer decisions to demand goods or services.
- Identify ways to resolve conflicts based on principles of fairness and justice.

SCIENCE



- Use a simple key to classify objects, organisms, and/or phenomena.
- Make inferences from phenomena and/or events.
- Identify the positive and/or negative impact of technology on human activity.
- Evaluate conclusions based on scientific data.
- Provide examples of transformation and/or conservation of energy in simple physical systems.
- Identify simple patterns in physical phenomena.
- Analyze behaviors and/or activities that positively or negatively influence human health.

BEST COPY AVAILABLE

SCHOOL BUILDING ENERGY AUDIT (8-12)

Students conduct an extensive energy audit of building systems including lighting, HVAC, water and waste management using tools such as *School Energy Doctor** and other resources. Students compile and analyze results, research possible solutions to their building's problems and present their findings to school administrators in both written and oral reports.

CORRELATION TO THE OHIO HIGH SCHOOL GRADUATION QUALIFYING EXAMINATIONS (HSGQE) LEARNING OUTCOMES

READING AND WRITING

Given a variety of selections, students will:

- Utilize multi-step directions to accomplish a task;
- Examine uses and purposes of propaganda;
- Support an interpretation by locating specific information;
- Differentiate between fact and opinion;
- Draw inferences and make predictions; and
- Evaluate the effectiveness of resource material for a specified audience/purpose.

In a writing sample, students will:

- Develop a clear, focused main idea or ideas in response to an issue;
- Demonstrate completeness;
- Include supporting details appropriate to the audience, purpose and topic;
- Follow purposeful organization; and
- Make connections among ideas, paragraphs, and sentences.

MATHEMATICS

- Estimate and compute with real numbers.
- Apply rates, ratios, proportions and percentages.
- Represent a mathematical relationship using a table, graph, symbols, and words, and describe how a change in the value of one variable affects the value of a related variable.
- Use measurement techniques including scale drawings, formulas and geometric relationships to find length, perimeter, area, surface, area, and volume.
- Create, interpret and/or analyze tables, charts, and graphs involving data.
- Choose and apply measurements of central tendency (mean, median or mode) and variability (range and visual displays of information).
- Apply problem-solving strategies and evaluate processes, strategies, calculations, and solutions to verify reasonableness; and use mathematical reasoning to validate and/or generalize approaches, arguments, strategies, and solutions.

CITIZENSHIP

Analyze civic issues by identifying:

- Alternative points of view;
- Relevance and reliability of information;
- Potential impact on individuals, groups or institutions; and
- Ways to resolve issues by applying the principles of fairness and justice.

Explain the importance of participatory citizenship in a democratic society by:

- Relating the rights and responsibilities of citizenship (including the Bill of Rights and Fourteenth Amendment);
- Describing various means of civic participation; and
- Analyze issues related to civic participation.

SCIENCE

- Evaluate or design scientific investigations to formulate and/or revise scientific explanations and models.
- Evaluate information derived from popular and technical sources to determine its scientific validity in making evidence-based decisions.
- Given a personal, societal, or global circumstance, identify, interpret, and/or apply appropriate safety precautions and equipment.
- Relate uses, properties, and chemical processes (reactions of matter) to the behavior and/or arrangement of small particles which compose matter.
- Analyze transformations of energy and recognize its conservation (constancy) within a system.
- Relate changes in the form or distribution of matter to the cyclic and finite nature of resources within the closed Earth system.
- Explain how living things interact with the living and non-living components of the environment.

* *School Energy Doctor,* © 1997, 1996 Center for Renewable Energy and Sustainable Technology and Solar Energy Research and Education Foundation, All Rights Reserved in the United States and Internationally.

BEST COPY AVAILABLE

INFORMATION RESOURCES

Ohio Energy Project
www.ohioenergy.org

Alliance to Save Energy
www.ase.org

Earthday Coalition (Cleveland area)
www.earthdaycoalition.org

Foundation for Environmental Education (Schools Going Solar)
www.the-environment.org

National Energy Education Development Project (NEED)
www.need.org

Ohio Department of Development, Office of Energy Efficiency
www.odod.state.oh.us/cdd/oee

Ohio-Kentucky-Indiana Regional Council of Governments (Cincinnati area)
www.oki.org

Ohio School Facilities Commission
www.osfc.state.oh.us

Project CLEAR (Columbus area)
Community Leadership to Effect Air Emissions Reductions
www.projectclear.org

U.S. Department of Energy, Clean Cities
www.ccities.doe.gov

U.S. Department of Energy, EnergySmart Schools Campaign
www.eren.doe.gov/energysmartschools

U.S. Department of Energy, Million Solar Roofs Initiative
www.eren.doe.gov/millionroofs

U.S. Department of Energy, Rebuild America Program
www.eren.doe.gov/buildings/rebuild

U.S. Environmental Protection Agency, ENERGY STAR Programs
www.energystar.gov

In December 1999, a group of students were honored in Washington D.C. as EnergySmart Ambassadors by the U.S. Department of Energy. These students wrote the proclamation below as a directive for superintendents across the nation.

PROCLAMATION

We must do more to improve the use of energy in our schools. We encourage you to take action that will save energy and protect the environment.

IN EDUCATION

Teach us about how we use energy and how it affects the environment. Teach us how saving energy and using renewable energy sources can help our school save money and improve our education. Help us form clubs at school that can find ways to save energy, both at school and at home.

IN BUILDINGS

Make sure our new schools are energy efficient and use renewable energy for lighting and heating. Help repair our heaters and air conditioners to make our schools more comfortable and better places to learn.

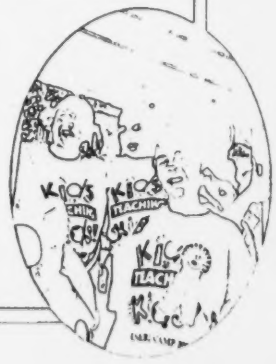
IN TRANSPORTATION

Use buses that use cleaner fuels and less energy, and look for ways to encourage car-pooling.

IN MAINTENANCE AND OPERATIONS

Make sure we turn off lights and other equipment when we're not in school. Buy energy efficient lights and equipment when we replace things.

Thank you for helping to improve our schools and save our planet.



Visit the EnergySmart Schools website to sign the proclamation at:
http://www.eren.doe.gov/energysmartschools/essdb/sign.cfm

7099 Huntley Rd., Suite 105A
Columbus, Ohio 43229-1068
(614) 785-1717
fax: (614) 785-1731
email: OEP@ohioenergy.org or swenergy@infinet.com
Visit us on the web: http://www.ohioenergy.org

Ohio Energy Project is an affiliate of the National Energy Education Development (NEED) Project

OEP BOARD OF DIRECTORS

Lynne Ayres
OEP Board President
Columbia Gas of Ohio, Ret.

Beth Rudner
OEP Board Vice President
American Municipal Power
– Ohio, Inc.

Jackie Bird, Trustee
Ohio Department of Development
Ohio Coal Development Office

Andrew Boatright, Trustee
Westerville Electric Division

Jeff Gerken, Trustee
American Electric Power Company

Shauni Nix, Trustee
Ohio Energy Project

Barry Schumann, Trustee
American Electric Power Company

Saundra Brennan
Columbus Public Schools

Rita Chasteen
Dayton Power and Light

John Cunningham
The MONY Group

Jerald Droll
Ohio Consumers' Counsel

Terry Ferguson
WaterFurnace International

Craig Glazer, Ex-Officio
PJM Interconnection, LLC

Doug Haskell
University of Cincinnati
Center for Economic Education

Jim Javins
Enron Energy Services, Inc.

Delores Jones
FirstEnergy Corporation

Tracey Lemmon
Energy Installations for the
Ohio Propane Gas Association

Beth Smith
Marathon Oil Company

George Sundrup
Cinergy/Community Energy
Partnership

Michael Swanalger
Market Reach Strategies for IEU

Stjepan Vlahovich, Ex-Officio
Ohio Department of Development
Office of Energy Efficiency

Bill Yost
United States Geological Survey

SE065787

ERIC

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

REPRODUCTION RELEASE

(Specific Document)

I. DOCUMENT IDENTIFICATION:

Title:

EnergySmart Schools: Creating a Sustainable Learning Environment in Ohio

Author(s): Ohio Energy Project

Corporate Source: Ohio Energy Project	Publication Date: 2000

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, *Resources in Education* (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic media, and sold through the ERIC Document Reproduction Service (EDRS). Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following three options and sign at the bottom of the page.

The sample sticker shown below will be affixed to all Level 1 documents	The sample sticker shown below will be affixed to all Level 2A documents	The sample sticker shown below will be affixed to all Level 2B documents
PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY Ohio Energy Project TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) 1	PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE, AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY, HAS BEEN GRANTED BY TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) 2A	PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) 2B
Level 1 X	Level 2A X	Level 2B X
Check here for Level 1 release, permitting reproduction and dissemination in microfiche or other ERIC archival media (e.g., electronic) *and* paper copy	Check here for Level 2A release, permitting reproduction and dissemination in microfiche and in electronic media for ERIC archival collection subscribers only	Check here for Level 2B release, permitting reproduction and dissemination in microfiche only

Documents will be processed as indicated provided reproduction quality permits.
If permission to reproduce is granted, but no box is checked, documents will be processed at Level 1.

I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche or electronic media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries.

Sign here, please

Signature: Shauni Nix	Printed Name/Position/Title: Shauni Nix / Executive Director	
Organization/Address: Ohio Energy Project 1640 Enterprise Drive - Suite A Lewis Center, Oh 43035	Telephone: 614-785-1717	FAX: 614-785-1731
	E-Mail Address: ~~Ohio Energy~~ oep@ohioenergy.org	Date: 4-30-02

III. DOCUMENT AVAILABILITY INFORMATION (FROM NON-ERIC SOURCE):

If permission to reproduce is not granted to ERIC, *or*, if you wish ERIC to cite the availability of the document from another source, please provide the following information regarding the availability of the document. (ERIC will not announce a document unless it is publicly available, and a dependable source can be specified. Contributors should also be aware that ERIC selection criteria are significantly more stringent for documents that cannot be made available through EDRS.)

Publisher/Distributor:
Address:
Price:

IV. REFERRAL OF ERIC TO COPYRIGHT/REPRODUCTION RIGHTS HOLDER:

If the right to grant this reproduction release is held by someone other than the addressee, please provide the appropriate name and address:

Name:
Address:

V. WHERE TO SEND THIS FORM:

Send this form to the following ERIC Clearinghouse:

ERIC/CSMEE
1929 Kenny Road
Columbus, OH 43210-1080
E-mail: beckrum.1@osu.edu
FAX: 614-292-0263